

Response Under 37 CFR 1.116
Expedited Procedure
Examining Group 3746

Claims 1-14 (Cancelled).

15. (New) A Metering pump device for a vehicle heater, comprising an inlet chamber (40), an outlet chamber (54), a first valve assembly (66) between the inlet chamber (40) and the outlet chamber (54), which permits fluid exchange substantially only from the inlet chamber (40) to the outlet chamber (54), a displacement piston element (12), which is movable to and fro in an opening (16) formed in a piston housing (14) between a first piston position, in which it minimizes the volume of the inlet chamber (40) and a second piston position, in which it minimizes the volume of the outlet chamber (54), a reduction (V_1) in the volume of the inlet chamber (40) being greater than an increase (V_2) in the volume of the outlet chamber (54) on movement of the displacement piston element (12) from the second piston position to the first piston position, wherein the opening (16) is of stepped construction, with a portion (20) of smaller diameter and a portion (26) of larger diameter, the displacement piston element (12) comprises a portion (28) of smaller diameter, the size of which is conformed to the smaller diameter portion (20) of the opening (16) and which is guided in the smaller diameter portion (20) of the opening (16), the displacement piston element (12) comprises a portion (30) of larger diameter, the size of which is conformed to the larger diameter portion (26) of the opening (16) and which is guided in the larger diameter portion (26) of the opening (16), the piston housing (14) is surrounded by a coil (32) of an electromagnetic drive (34) in the region in which the smaller diameter portion (20) of the opening (16) is formed,

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the displacement piston element (12) is inserted with its smaller diameter portion (28) into the coil (32) and forms an armature (36) of the electromagnetic drive (34), a fluid feed line is provided in the displacement piston element (12), which line is open at the smaller diameter portion (28) of the displacement piston element (12) to the smaller diameter portion (20) of the opening (16), which comprises an orifice leading to the inlet chamber (40) at the larger diameter portion (30) of the displacement piston element (12) and which is closable by a second valve assembly (76), which permits fluid exchange substantially only from the fluid feed line (12) to the inlet chamber (40).

16. (New) A metering pump device according to claim 15, characterized in that in the first piston position the displacement piston element (12) is inserted with a first piston region (86) into the inlet chamber (40) and in the second piston position the displacement piston element (12; 12a) is inserted with a second piston region (88) into the outlet chamber (54; 54a).
17. (New) A metering pump device according to claim 15, characterized in that, in a first piston region (86), the displacement piston element (12) comprises a first displacement surface effective upon movement of the displacement piston element (12) in the direction of the first piston position and, in a second piston region (88), it comprises a second displacement surface (89) effective upon movement of the displacement piston element (12) in the direction of the second piston position, and in that the first displacement surface (87) is larger than the second displacement surface (89).

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18. (New) A metering pump arrangement according to claim 17, characterized in that the first displacement surface (87) and the second displacement surface (89) have a mutual surface ratio of 2:1.
19. (New) A metering pump arrangement according to claim 16, characterized in that the displacement piston element (12) comprises a piston portion (30) providing the first piston region (86) and the second piston region and a displacement portion (28) which is inserted into the outlet chamber (54) upon movement of the displacement piston element (12) from the first piston position to the second piston position.
20. (New) A metering pump device according to claim 15, characterized in that the displacement piston element (12) is displaceable between the first piston position and the second piston position.
21. (New) A metering pump device according to claim 15, characterized in that the region (42) of the inlet chamber (40) into which the first piston region (86) is inserted in the first piston position, and the region (62) of the outlet chamber (54) into which the second piston region (88) is inserted in the second piston position are constructed at least in part in the piston housing (14).
22. (New) A metering pump device according to claim 21, characterized in that the piston housing (14) is surrounded at least in places by a chamber housing (38) and in that the inlet chamber (40) and/or the outlet chamber is/are formed at least in part between the piston housing (14) and the chamber housing (38).

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23. (New) A metering pump device according to claim 15, characterized in that the first valve assembly (66) and/or the second valve assembly (76) takes the form of a non-return valve.
24. (New) A metering pump device according to claim 23, characterized in that the first valve assembly (66) and/or the second valve assembly (76) comprises a spring-biased valve member (68, 78).
25. (New) A metering pump device according to claim 15, characterized in that the first valve assembly (66) comprises a valve seat (90) and a valve member (68) which may be pressed against the valve seat (90), the valve seat (90) of the first valve assembly (66) being provided on a housing (14, 38) accommodating the displacement piston element (12).